Simultaneous reduction and functionalization of graphene oxide via alkanolamines for energy storage applications

간델왈마히마, 정진석†
울산대학교
(jschung@mail.ulsan.ac.kr†)

Graphene has been extensively investigated in the fields of sensing, catalysis, fuel cells and energy storage materials due to its extraordinary physicochemical properties. However, it suffers from poor electrochemical behavior due to unavoidable restacking of graphene sheets during reduction process. This problem can be avoided by the chemical functionalization of graphene via covalent and non-covalent approaches. Herein, we report the simultaneous reduction and functionalization of GO via different alkanolamine(s) employing simple hydrothermal approach. The reduction and functionalization of rGO(s) were investigated by several techniques including XRD, Raman, BET, TGA, FTIR and XPS measurements. Interestingly, the reduced and functionalized rGO(s) resulted in stabilized structure with enhanced surface area and total pore volume as compared to unmodified rGO. Among various synthesized functionalized rGO(s), triethanolamine functionalized rGO (rGO-TEA) exhibited impressive capacitance value , high energy density, long cycling stability and high coulombic efficiency exhibiting its significant potential for energy storage applications.